

CASES OF ASCARIASIS AND HEMORRHAGES.

3905. See above with "*Ascaris* in Bile Ducts and Liver."

2029. Already published in full by Crowell and Hammack. Briefly, this was an eight-year-old Filipino, who, six days before death, was seized with an attack of vomiting, followed on the next day by pain in the chest and knees. There soon developed external edema, jaundice, melena, hemorrhage from the gums, dyspnea, prostration and ecchymoses on the face and legs. The day before death there were severe anemia, hemic cardiac murmurs, negative Widal reaction, sterile blood culture and no fever. The anatomical diagnosis at autopsy was: ascariasis (150 *ascarides* in stomach and intestine); purpura hemorrhagica; ecchymoses, cutaneous, epicardial, pleural, retropleural, retroperitoneal, gastric and intestinal; partial atelectasis of lungs; anemia; hemorrhage into intestines; trichuriasis; ankylostomiasis.

CONCLUSION. The dangers of ascariasis are liable to be underestimated, and for this reason a number of cases, fatal and otherwise, have been here reported for the purpose of attracting attention to this important subject. These worms may cause symptoms and even death through toxic, reflex and mechanical effects either in the larval stage or while adult in the intestine or in the course of their migrations to other parts of the body. Cases of disease of the intestine or other parts may assume much more than their usual seriousness on account of the presence of these worms, and the accidents due to the migratory proclivities of the worm may cause fatal complications of simple surgical procedures that would otherwise have terminated happily. The number of cases that I have here recorded, which constitutes only a fraction of those I have seen, is not great. It, however, indicates that a thorough and systematic examination of the cases of ascariasis would bring to light as many cases in the experiences of others, and would prove ascariasis to have the importance that I have ascribed to it.

EVIDENCES OF NEPHRITIS AND URINARY ACIDOSIS.

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IF the reader of this discussion finds that he cannot subscribe to the title under which I shall treat the present subject, I will beg his indulgence on three points: (1) on the fact that if a specimen of urine were submitted to him for analysis and he found it to contain albumin, blood cells and casts, he could not possibly deny that the individual from whom the specimen was obtained had a neph-

ritis; (2) that such findings are the main evidences of an actual nephritis in all but the late stages of disease; (3) that if such findings occurred in the course of an acute infection, for example, the inference would almost invariably be that a nephritis existed.

I therefore prefer to treat the subject-matter of this paper from the viewpoint of nephritis, because, from such a viewpoint these findings have greater clinical significance, and not because I believe that a true nephritis existed. And also because the acidosis theory of nephritis has up to the present time been neither accepted nor rejected.

PREVIOUS OBSERVATIONS. In an earlier work¹ it was shown that severe and prolonged muscular exertion is accompanied by circulatory disturbances sufficient to cause the presence of blood cells, albumin and casts in the urine. Those observations suggested the inquiry whether anything short of a Marathon race (24.85 miles) would produce similar findings, and the question is answered in the present investigation.

It is interesting to note that an individual who immediately before exercise had a perfectly normal urine will, after forty minutes of exercise, show albumin, red blood cells, hyaline and granular casts. It is indeed surprising to note the rapidity with which hyaline and granular casts are formed in the urinary tubules.

Before going further, I wish to quote a summary of the observations made in Marathon runners:

URINARY FINDINGS BEFORE MARATHON RACE, IMMEDIATELY AFTER
AND AT SUBSEQUENT PERIODS.

	Number of cases.	Albumin.	Blood.	Casts.	Acet. bodies.
Before	24	1			
Immediately after	19	19	18	19	18
One week later	19	19	..	6	
Three weeks later	3	3	..	3	

As will be seen from the above table this inordinate exertion, running a distance of 24.85 miles in a period of 3 hours 14 minutes to 4 hours 15 minutes, produced albuminuria accompanied by blood and casts in all the cases. Five of these showed "showers of casts."

We made also numerous observations on the blood-pressure of those subjects, and in correlating the findings it became evident that albumin occurred in largest amounts in those cases which showed the greatest fall in the maximum pressure and in those which showed most marked falls in the pulse-pressure. Those findings correspond with the studies of Erlanger and Hooker,²

¹ Barach, Joseph H.: Physiological and Pathological Effects of Severe Exertion (the Marathon Race) on the Circulatory and Renal Systems, *Arch. Int. Med.*, 1910, v, 382.

² An Experimented Study of Blood-pressure and Pulse-pressure on Man, *Johns Hopkins Hosp. Rep.*, 1904, xii, 145.

who showed that a direct relationship exists between pulse-pressure and urinary excretion. Later on it was shown by Gesell³ that in the excised kidney, with a given amount of blood, the urinary excretion is greater when the pulse-pressure is larger, diuresis being determined by the size of the pulse-pressure.

The conclusions derived from that study were: From these observations upon the renal functions it seems that the more serious the disturbance of the general circulatory system the more marked are the evidences of this disturbance in the renal circulation. This is shown by the amount of blood and the degree of albuminuria and cylindruria. In these observations no quantitative analyses of the urinary acidity were made.

Since that work, however, it has been stated by Bornstein and Lippman,⁴ who are in agreement with Martin Fisher, that the albuminuria and cylindruria following severe exertion is caused by the increased urinary acidity,⁵ the acid products of increased metabolism irritating the kidneys. This is a most important question in clinical medicine, and we may well bring all of our evidences together for the proper solution of such a problem.

PRESENT STUDY. The following observations were made upon a series of 57 normal young men before and after baseball and daily "try-outs" on the track. These young men were of better than average health, having passed the required physical examination prior to their entrance into the field of competitive sports.

Our observations included the body weight before and after effort, urinalyses before and immediately after, including the amount of urine excreted during the work period, estimation of the hydrogen ion concentration of the urine and examination for albumin, casts and blood cells.

LOSS OF WEIGHT AND URINARY EXCRETION. In the entire series the greatest loss of weight occurred in a subject who weighed 129½ pounds. His loss in 1 hour and 50 minutes of baseball was 5.5 pounds. One subject showed no loss at all and the average loss for all cases was 1.3 pounds. This decrease in body weight was mostly due to loss of water.

The 10 individuals showing the largest amount of urine, and whose average excretion was 87 c.c., lost on an average of 1.55 pounds each, while the 10 whose average was 27 c.c. lost on an average 1.1 pounds each.

DURATION OF THE EFFORT. The average time spent in running was 48.1 minutes. The average time spent in baseball was 1 hour 57 minutes.

³ The Relation of Pulse-pressure to Renal Secretion, *Am. Jour. Physiol.*, 1913, xxii, 70.

⁴ Weitere Beiträge zur nicht Nephritischen Albuminurie, *Ztschr. f. klin. Med.*, 1918, lxxvi, 345.

⁵ Gesell, R.: *Loc. cit.*

Taking the first 10 who spent the longest time and the 10 who spent the least time in the exertion the number in which albumin, blood cells and casts were found was exactly the same in both, showing that in this series time element was not a factor.

URINARY ACIDITY. In order to estimate the hydrogen ion concentration, *i. e.*, to estimate the total potential acidity of the urine, we used the method of Folin, which consists of adding a liberal quantity of neutral potassium oxalate to the urine, and then titrating with $\frac{N}{10}$ NaOH, using phenolphthalein as an indicator.

By this method we found that 85 per cent. of all the urines after exercise showed an increased acidity. The actual number of increased acid urines was exactly the same in the baseball cases as in the more strenuous type—the track cases.

The acidity was greater in the 10 cases which showed an average urinary output of 27 c.c. than in the 10 which had an average output of 87 c.c. during the exercise period.

Albumin and casts occurred as frequently in the low acid cases as in the high acid cases.

The average increase in total acidity for the cases showing casts was 16.8—as against an acidity of 18.8 in cases not showing casts.

From all this, the deduction which seems warranted is that the height of the urinary acidity does not determine the presence of albumin, blood cells and casts.

ALBUMINURIA. Seventy-seven per cent. of the entire series showed albuminuria as a result of the effort.

Out of 36 "baseball" cases, 26 showed albumin and 10 showed none.

Out of 18 "track" cases, 16 showed albumin and 2 showed none.

The inference here is plain that albuminuria occurs more frequently as a result of strenuous effort, *i. e.*, those cases in which there is the greatest amount of circulatory disturbance.

MICROSCOPIC FINDINGS. *Casts and Red Blood.* After running on the track 71 per cent. had hyaline and granular casts and a small percentage of red blood cells. After baseball 23 per cent. had hyaline and granular casts or red blood cells. From this we may also infer that the more strenuous type of exertion causes casts and blood cells to appear in the urine.

RÉSUMÉ. These observations show that in the most severe type of exertion (Marathon race), albumin and casts and red blood cells occur in all individuals. The casts were of the broad and narrow, hyaline and granular variety. Some of the casts showed red and white corpuscles. The amount of albumin was greatest in those who ran most strenuously, finishing earliest, 3 hours 14 minutes to 4 hours 15 minutes.

Observations of the blood-pressures and pulse-rate in these cases showed that the largest amount of albumin and blood and casts occurred in those individuals who showed the greatest degree of

circulatory disturbance. This was manifested by a marked fall in both the maximum blood-pressure and in the pulse-pressure.

In the less strenuous type of exertion we usually find an increased urinary acidity, albuminuria, cylindruria, and at times blood cells.

A critical analysis of these findings, however, shows, first of all, that in the more strenuous effort the amount of albumin, the presence of blood cells and the number and type of casts all depict a more serious renal disturbance than is found in the less strenuous form of exercise.

Urinary acidity was increased after exercise in 85 per cent. of the cases, but it did not occur more frequently, nor was the acidity higher in the severe exertion cases than in the milder ones.

There is a positive relationship between the degree of albuminuria and cylindruria and the type of physical exertion; but these observations show that no such relationship can be established between the urinary acidity and the occurrence of albumin, casts and blood cells in the urine.

THE ASSOCIATION OF FEVER WITH FRACTURE OF THE SKULL.

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A SLIGHT rise of temperature is so common after fracture of the skull—with and without injury of the intracranial contents—that one rather expects it in almost every case; the rise is rarely above 100° F., is short-lived and lasts for approximately twenty-four hours, after which subsidence to the normal occurs and the latter continues until convalescence is completed. In some of the patients, however, fever assumes a more important role: it rises to extraordinary heights; it persists for comparatively long periods of time; it indicates some grave complication or the reaction to an extensive trauma. The cases in this latter group form the basis for this communication.

Such fever occurred in 15 of a series of 72 cases of fracture of the skull which were recently studied—21 per cent. In another series of cases of fracture of the skull, admitted to the hospital in a different period of time, 22 patients of a total of 77 developed fever—29 per cent. In the 15 febrile cases of the first series the fractures were situated in the posterior fossa in 6, and in the middle fossa in 2; in the others the fractures were distributed over the vertex and sides of the skull. One fracture was compound externally; one communicated with the middle ear and 2 with the nasal cavities; the